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THE NURSE AND HER RELATION TO IMMUNOLOGY: ANAPHYLAXIS

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No discussion of immunology, particularly as concerned with its practical application in the treatment of disease, would be complete without some reference to what are known as anaphylactic reactions. Under this heading come certain phenomena, sometimes local, sometimes general, and occasionally fatal in their manifestations, which are collectively grouped as "serum sickness" and comprise what are scientifically known as manifestations of anaphylaxis.

Anaphylaxis, from Greek words meaning "without protection," is defined as a state of hypersusceptibility or extreme sensitivity following the injection of a foreign protein or its cleavage products. No understanding of immunologic principles or their applications can be had without an understanding of at least the basic principles of anaphylaxis, because the two principles are intimately associated. While, at first, they were thought to be opposed and that, in anaphylaxis, as has been said, "the principles of immunity were standing on their heads," we now know that anaphylaxis is a stage which occurs in the development of immunity.

Anaphylaxis may be briefly summarized as follows: A foreign protein, not in itself toxic, gains entrance to the circulation for the first time. As a result, the production of antibodies occurs, certain of which are intimately associated with the cells which produced them. These antibodies seem to be in the nature of a ferment. Now, if after the expiration of a length of time sufficient for their accumulation in the circulation, a second dose of the same protein is given, these ferment-like antibodies act upon it, splitting it into substances some of which are toxic and act upon the body cells causing injury, the expression of which is the anaphylactic reaction. When antibodies are absent or few in number we have, therefore, a state of sensitiveness; when they are numerous and attached to the body cells, the individual is in a hypersensitive or anaphylactic state; when they are free and in excess in the blood stream we have the state of immunity. The intimate relation between the two processes is, therefore, evident. So far as is known *only proteins can produce anaphylaxis.*

In the animal, anaphylactic reactions are evidenced by muscular twitchings, a rapid fall of blood pressure, convulsions, paralyses, and striking interference with the respiratory functions, due to a spasmodic contraction of the involuntary muscle of the bronchioles causing an asphyxia due to inability to draw air into the lungs, the whole train of symptoms being rapidly produced and soon followed by death.

In man, anaphylaxis may be evidenced by several phenomena: 1. Urticaria, following the ingestion of certain protein foods, as eggs, sea foods, milk, certain berries, etc. 2. "Hay fever," due to the protein in various pollens. 3. "Serum sickness," due to the injection of immune serums in the treatment of disease.

Serum sickness is characterized by fever, skin eruptions,—which may assume a great variety of forms,—swelling of the lymph glands, edema, leukopenia, and joint symptoms which may be very severe. Rarely there is marked dyspnoea, collapse and death.

In the production of anaphylaxis, three stages may be distinguished: (a) Sensitization; (b) incubation; and (c) intoxication. Sensitization is the term used to indicate the introduction of the foreign protein which, in the animal, may be done by hypodermic injection, by feeding, or by installation into the conjunctival sac. In the animal the state of sensitization may be inherited and is absolutely specific for the protein injected. Incubation is the stage following sensitization, or the introduction of the anaphylactogen, during which the antibodies are being produced, or the period elapsing before the reintroduction of the same protein will cause anaphylactic symptoms. This condition develops gradually, reaches a maximum, and then may either diminish or remain constant. The duration of the period of incubation is somewhat uncertain,—in man, being from seven to ten days. In man, the antibodies may persist for as long as five years after the initial sensitization. Intoxication is the term used to denote the train of symptoms following the injection of the same protein into an individual already sensitized by a previous injection.

The Prevention of Anaphylaxis (Also Called Desensitization); Because of the possibility, though relatively infrequent, of violent and even fatal reactions in man, the injection of immune serums should always be safeguarded by the following precautions: 1. No serum should be injected without strict indications. 2. The serums should not be fresh and, if possible, should be purified to remove all the albumins possible. 3. Any history of previous serum injections, or of asthma, "hay fever" or food idiosyncrasies, etc., (evidencing sensitivity to proteins), should be obtained. 4. Intravenous injections should be avoided unless absolutely necessary and, if given, should be given *slowly*. 5. Atropin and adrenalin should be at hand for emergency hypodermic injection. 6. In doubtful cases, tests for sensitization should be made and, if positive, the patient should be desensitized. 7. It should not be forgotten that a preliminary injection of atropin will greatly ameliorate and even prevent anaphylactic reactions.

Sensitization may be tested for after the manner of a Von Pirquet reaction by rubbing a little of the serum to be injected into a slight skin abrasion, when local edema and papule formation will occur within a short space of time if the patient is hypersensitive, or it may be tested for by the hypodermic injection of a small amount, a positive reaction being evidenced by the same phenomena.

Desensitization is accomplished by the subcutaneous, intravenous, or intraspinal injection—according to the method by which the serum is to be used—of a small amount of the diluted serum, (0.1 to 1.0 cc. of a one to twenty dilution in normal saline solution), followed by the full dose after an interval of from two to three hours.

The treatment of anaphylaxis in its severer grades lies in the prevention of the occurrence. In the milder manifestations, the treatment is, in the main, symptomatic; namely, atropin and adrenalin hypodermatically for the respiratory symptoms, wet packs for the fever—avoiding coal-tar drugs and antipyretics—and local treatment for the urticaria and joint symptoms.

It is well to remember that while the symptoms of serum sickness, as usually seen, may come on with alarming rapidity and assume alarming proportions, as a rule they disappear within forty-eight to seventy-two hours and fatal results are, fortunately, infrequent, and that the possibility of serum sickness should never constitute a contraindication to the use of serum in those conditions in which serum alone offers a means of saving the patient.

MOSQUITOES

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Mosquitoes are biting gnats, small insects having two wings, six legs, and a body divided into three parts, the head, the thorax, and the abdomen. On the head of the mosquito are two large eyes, and projecting from the part of the face in front of, between, and below the eyes, is the proboscis, or "stinger." At either side of this are the palpi, or feelers, one on each side, and to the outer side of the feelers, are the antennae, or plumes. All persons who are bitten by mosquitoes have had experience with the proboscis, which contains a number of small lancet-like knives.

Male mosquitoes, *of all kinds,* may be distinguished from the